EFFECT OF WATER ABSORPTION ON THE FRICTION CHARACTERISTICS OF COIR FIBERS

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ABSTRACT
Coir fiber, extracted from agricultural waste: the husk of coconuts, is a natural fiber. Natural fibers are employed in textiles, mats, ropes, and various other applications due to their sustainability. In practical use, these fibers encounter friction when interacting with other counter materials' surfaces. Friction plays an important role in the durability of parts made of these fibers. Unlike synthetic fibers, the natural fibres are porous in nature and are hydrophilic. This research aims to investigate the influence of water on the friction behavior of coir fibers which will assist in the design of parts made of natural fibers and durability assessment.

To achieve the objective, a friction testing setup was developed based on the capstan method. The investigations of the friction coefficient for the single coir fibers against a polyamide cylinder were carried out following ASTM D3412 standards [1]. This study was conducted for two types of coir fibers: dry and water-soaked. The results indicate a noticeable increase in the friction coefficient upon water absorption by the coir fibers. The increase in friction can be attributed to the infiltration of water into the porous structures and rough surfaces of coir fibers, enhancing the contact area between the fibers and the cylinder.

Understanding the influence of water on coir fiber friction is crucial for designing and developing fiber-based sustainable products, especially in humid or wet environments. This research not only contributes to the fundamental knowledge regarding natural fiber friction but also provides insights for enhancing the functionality and durability of coir fibers by surface treatments and coatings in the future.

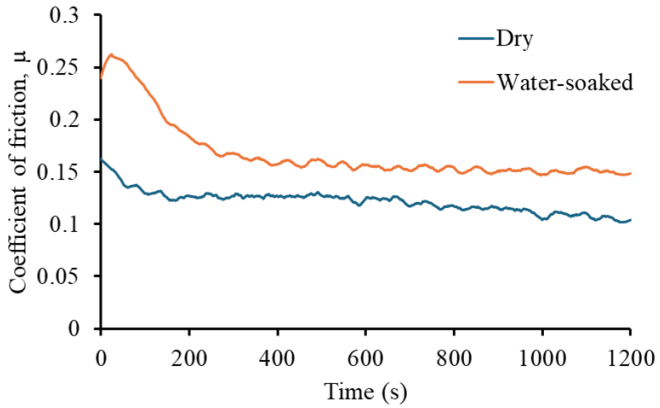

Fig.1: Coefficient of friction versus time graph for coir fibers

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